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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,584	04/25/2005	Samuel P. Kounaves	TU-2007US02	1732

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EXAMINER	
NOGUEROLA, ALEXANDER STEPHAN	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
10/29/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/517,584	KOUNAVES, SAMUEL P.	
	Examiner	Art Unit	
	ALEX NOGUEROLA	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-4 and 6-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glesener et al. US 6,267,866 B1 ("Glesener") in view of Swain et al.

US 2003/0170906 A1 ("Swain") and Kunimatsu et al. US 6,106,692 ("Kunimatsu") or in view of Zen et al. US 5,855,760 ("Zen").

Addressing claim 1, Glesener discloses an apparatus for measuring total organic carbon in aqueous solution (col. 04:59-62), comprising:

a) an electrochemical cell (col. 04:45-47) comprising:

i) a diamond-film electrode (col. 04:51); and

ii) a counter electrode (col. 04:51-52 – stainless steel cathode); and

b) a carbon dioxide sensor, including at least one gas-phase sensor (col. 04:62-67).

Glesener does not mention also using a reference electrode in the example relied on above. However, Glesener does disclose providing a reference electrode in an embodiment in which the diamond-film electrode is used as a measurement electrode rather than as a "combustion" (oxidation) electrode. See col. 03:33-52. Swain and Kunimatsu also disclose using a diamond-film electrode along with a reference electrode and a counter electrode in a measurement cell. See in Swain the abstract and paragraph [0055] and in Kunimatsu col. 09:56-67. it would have been obvious to one with ordinary skill in the art at the time of the invention to also provide a reference electrode along with a diamond-film electrode and a counter electrode as taught by Glesener, Swain, and Kunimatsu in the invention of Glesener because then the diamond-film electrode can also be used to measure various substances in the solution that normally could not be measured with conventional measurement electrodes in addition to also being used to oxidize all the organic substances in the

solution, thus enhancing the usefulness of the diamond-film electrode as not all the substances in the sample solutions will only contain organic substances. As taught by Glesener, Swain, and Kunimatsu, the diamond-film electrode has a much wider working potential range than conventional working electrodes and also can be used in harsher environments that conventional working electrodes. See in Glesener col. 02:19-39; in Swain paragraph [0048]; and in Kunimatsu col. 06:07-17.

Alternatively, Zen discloses an electrochemical cell for decomposing organic pollutants in acidic solution to carbon dioxide. See the abstract and Figure 1. Although Zen does not use a diamond-film electrode as a working electrode Zen does disclose that the electrochemical cell may be a three- or two-electrode system; that is, it may have both a counter electrode and reference electrode in addition to the working electrode or just a counter electrode in addition to the working electrode. See Figure 1 and col. 02:23-26. Thus, in light of Zen the choice of whether to also provide a reference electrode is essentially arbitrary, barring a showing of unexpected results.

Addressing claims 2, 6, 9, and 10, for the additional limitations of these claims see in Glesener col. 01:58-60.

Addressing claims 3, 4, and 8, for the additional limitations of these claims see in Glesener col. 04:62-67.

Addressing claim 7, Glesener discloses all of the claim limitations except for also providing a reference electrode in the electrochemical cell. See the rejection of claim 1 above and in Glesener col. 04:45 – col. 05:07. Note that combusting (oxidizing) organic compounds to CO_2 will inherently produce water and carbon dioxide.

As noted, Glesener does not mention also using a reference electrode in the example relied on above. However, Glesener does disclose providing a reference electrode in an embodiment in which the diamond-film electrode is used as a measurement electrode rather than as a "combustion" (oxidation) electrode. See col. 03:33-52. Swain and Kunimatsu also disclose using a diamond-film electrode along with a reference electrode and a counter electrode in a measurement cell. See in Swain the abstract and paragraph [0055] and in Kunimatsu col. 09:56-67. it would have been obvious to one with ordinary skill in the art at the time of the invention to also provide a reference electrode along with a diamond-film electrode and a counter electrode as taught by Glesener, Swain, and Kunimatsu in the invention of Glesener because then the diamond-film electrode can also be used to measure various substances in the solution that normally could not be measured with conventional measurement electrodes in addition to also being used to oxidize all the organic substances in the solution, thus enhancing the usefulness of the diamond-film electrode as not all the substances in the sample solutions will only contain organic substances. As taught by Glesener, Swain, and Kunimatsu, the diamond-film electrode has a much wider working potential range than conventional working electrodes and also can be

used in harsher environments that conventional working electrodes. See in Glesener col. 02:19-39; in Swain paragraph [0048]; and in Kunimatsu col. 06:07-17.

Alternatively, Zen discloses an electrochemical cell for decomposing organic pollutants in acidic solution to carbon dioxide. See the abstract and Figure 1. Although Zen does not use a diamond-film electrode as a working electrode Zen does disclose that the electrochemical cell may be a three- or two-electrode system; that is, it may have both a counter electrode and reference electrode in addition to the working electrode or just a counter electrode in addition to the working electrode. See Figure 1 and col. 02:23-26. Thus, in light of Zen the choice of whether to also provide a reference electrode is essentially arbitrary, barring a showing of unexpected results.

Addressing claim 11, Glesener discloses performing a cyclic voltammetry sweep from -2.0V_{SCE} to +2.5 V_{SCE} using the diamond-film electrode. See col. 03:50-52. Although this was for a measurement step, it shows that the diamond-film electrode could be used at a positive potential range of about 2-2.5 volts. In the oxidation example the power supply has a maximum output of 30 V and 6A. See col. 04: 57-59. Thus, barring evidence to the contrary, such as unexpected results, the choice of oxidation voltage, particularly 2-2.5 volts will just depend on the oxidation potential of the substances to be oxidized.

Addressing claim 12, Glesener discloses all of the claim limitations except for (1) also providing a reference electrode in the electrochemical cell, and (2) the step of

immersing the electrochemical cell of step a) into the aqueous solution. See the rejection of claim 1 above and in Glesener col. 04:45 – col. 05:07.

Note:

(1) that combusting (oxidizing) organic compounds to CO_2 will inherently produce water and carbon dioxide, and

(2) since limitation (d) states "using one or more carbon dioxide sensors [emphasis added]" the Examiner has assumed that "and at least one aqueous-phase sensor" should be -- or at least one aqueous-phase sensor --.

As noted, Glesener does not mention also using a reference electrode in the example relied on above. However, Glesener does disclose providing a reference electrode in an embodiment in which the diamond-film electrode is used as a measurement electrode rather than as a "combustion" (oxidation) electrode. See col. 03:33-52. Swain and Kunimatsu also disclose using a diamond-film electrode along with a reference electrode and a counter electrode in a measurement cell. See in Swain the abstract and paragraph [0055] and in Kunimatsu col. 09:56-67. it would have been obvious to one with ordinary skill in the art at the time of the invention to also provide a reference electrode along with a diamond-film electrode and a counter electrode as taught by Glesener, Swain, and Kunimatsu in the invention of Glesener because then the diamond-film electrode can also be used to measure various substances in the solution that normally could not be measured with conventional measurement electrodes in addition to also being used to oxidize all the organic substances in the solution, thus enhancing the usefulness of the diamond-film electrode

as not all the substances in the sample solutions will only contain organic substances. As taught by Glesener, Swain, and Kunimatsu, the diamond-film electrode has a much wider working potential range than conventional working electrodes and also can be used in harsher environments that conventional working electrodes. See in Glesener col. 02:19-39; in Swain paragraph [0048]; and in Kunimatsu col. 06:07-17.

Alternatively, Zen discloses an electrochemical cell for decomposing organic pollutants in acidic solution to carbon dioxide. See the abstract and Figure 1. Although Zen does not use a diamond-film electrode as a working electrode Zen does disclose that the electrochemical cell may be a three- or two-electrode system; that is, it may have both a counter electrode and reference electrode in addition to the working electrode or just a counter electrode in addition to the working electrode. See Figure 1 and col. 02:23-26. Thus, in light of Zen the choice of whether to also provide a reference electrode is essentially arbitrary, barring a showing of unexpected results.

As for the step of immersing the electrochemical cell of step a) into the aqueous solution, the Examiner has not been able to yet find a description or illustration of the electrochemical cell used by Glesener that addresses this limitation so he will assume that Glesener does not meet this limitation, for now. However, to meet this limitation merely requires structural change to the cell container and cover that would not affect the oxidation and measurement processes. In Zen, for example, the working electrode, reference electrode, and counter electrode are attached to the cover of the electrochemical cell so they must necessarily be immersed into the aqueous solution

when the electrochemical cell is to be used. So this limitation could be easily meet by attaching the electrodes to the electrochemical cell cover.

4. Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glesener et al. US 6,267,866 B1 ("Glesener") in view of Swain et al. US 2003/0170906 A1 ('Swain") and Kunimatsu et al. US 6,106,692 ("Kunimatsu") or in view of Zen et al. US 5,855,760 ("Zen") as applied to claim 1-4 and 6-12 above, and further in view of Nishino et al. US 4,755,473 ("Nishino").

Addressing claim 5, note that underlying claim 1 has a gas-phase sensor instead of an aqueous-phase sensor. So, the Examiner has assumed that the phrase "the aqueous-phase sensor" was intended to instead be -- the gas-phase sensor --.

In Glesener as modified by Swain and Kunimatsu or by Zen the gas-phase sensor is an IR detector.

Nishino discloses an ion-selective electrode for measuring carbon dioxide. See the abstract. It would have been obvious to one with ordinary skill in the art at the time of the invention to use a ion-selective electrode as taught by Nishino in the invention of Glesener as modified by Swain and Kunimatsu or by Zen because as taught by Nishino IR detectors are "... expensive and could hardly be small in size. In addition, the measurements utilizing the method are susceptible to the influence of dusts and other contaminants." See col. 01:68 – col. 0-2:03.

Addressing claim 13, In Glesener as modified by Swain and Kunimatsu or by Zen the gas-phase sensor is an IR detector.

Nishino discloses an ion-selective electrode for measuring carbon dioxide. See the abstract. It would have been obvious to one with ordinary skill in the art at the time of the invention to use a ion-selective electrode as taught by Nishino in the invention of Glesener as modified by Swain and Kunimatsu or by Zen because as taught by Nishino IR detectors are "... expensive and could hardly be small in size. In addition, the measurements utilizing the method are susceptible to the influence of dusts and other contaminants." See col. 01:68 – col. 0-2:03.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 6, 12, and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "aqueous-phase" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim !2: if there is at least one gas-phase carbon dioxide sensor and at least one aqueous-phase carbon dioxide sensor how can there just be one carbon dioxide sensors?

Note that dependent claims will have the deficiencies of base and intervening claims.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Alex Noguerola/
Primary Examiner, Art Unit 1795
October 27, 2008